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| 10/531,196 | 12/12/2005 | Shigeto Okada | 133.0010 | 6274 |

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| EXAMINER | |
|---|---|
| SIDDIQUEE, MUHAMMAD S | |
| ART UNIT | PAPER NUMBER |
| 4151 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/531,196 | OKADA ET AL. | |
| | Examiner | Art Unit | |
| | MUHAMMAD SIDDIQUEE | 4151 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *13 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Objections*

1. Claims 9-10 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. See MPEP § 608.01(n).

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1 and 10 are rejected under 35 U.S.C. 102(a)/(e) as being anticipated by Armand et al (US 6,514,640).

4. Regarding claim 1, Armand discloses a method for producing a cathode material for a secondary battery, comprising the steps of mixing a compound ($NH_4H_2PO_4.H_2O$) which releases phosphate ions in a solution with water and metal iron ($Fe(CH_3CO_2)_2$) to dissolve the metal iron, adding lithium carbonate ($Li_2CO_3$) or lithium hydrate ($LiOH.H_2O$) thereof to the solution, and calcining the reaction mixture to synthesize $LiFePO_4$ [column 15, lines 36-41].

5. Claims 1-10 are rejected under 35 U.S.C. 102(a)/(e) as being anticipated by Hatta et al (CA 2456056).

Regarding claims 1 and 10, Hatta discloses a method for producing a cathode material for a secondary battery, comprising the steps of mixing a compound which releases phosphate ions (phosphoric acid) [page 21, lines 3-8] in a solution with water and metal iron (Fe) [page 20, lines 2-16] to dissolve the metal iron, adding lithium carbonate ($Li_2CO_3$), lithium hydroxide (LiOH) thereof to the solution, and calcining the reaction mixture to synthesize $LiFePO_4$ [page 21, lines 23-25; page 22, line 1]

Regarding claim 2, Hatta discloses that the calcining step has a first stage in a temperature range of room temperature to 300 through 450°C and a second stage in a temperature range of room temperature to the calcination completion temperature, and the second stage of the calcining step is carried out after addition of a substance from which conductive carbon is formed by pyrolysis to the product of the first stage of the calcining step [page 30, lines 4-18; page 32, lines 4-14].

Regarding claim 3, Hatta discloses that the calcination is carried out after conductive carbon is added to the ingredients before the first stage of the calcining step [page 31, lines 12-20].

Regarding claim 4, Hatta discloses that the calcining step has a first stage in a temperature range of room temperature to 300 through 450°C and a second stage in a temperature range from room temperature to the calcination completion temperature, and the calcination is carried out after conductive carbon is added to the ingredients before the first stage of the calcining step [page 30-32].

Regarding claims 5-6, Hatta discloses that the substance from which conductive carbon is formed by pyrolysis is a bitumen [page 11, lines 22-24] and the bitumen is a coal pitch which has a softening point in a range of 80 to 350°C and a pyrolytic weight-loss initiation temperature in a range of 350 to 450°C and from which conductive carbon is formed by pyrolysis and calcination at a temperature of 500 to 800°C [page 12, lines 3-8].

Regarding claims 7-8, Hatta discloses that the substance from which conductive carbon is formed by pyrolysis is a saccharide [page 12, lines 19-21] and the saccharide is one which is decomposed at a temperature in a range of 250°C or higher to lower than 500°C and gets partially melted at least once in the course of heating from 150°C up to the temperature at which it is decomposed and from which conductive carbon is formed by pyrolysis and calcination at a temperature not lower than 500°C and not higher than 800°C [page 13, lines 5-10].

Regarding claim 9, Hatta discloses that the method for producing a cathode material for a secondary battery wherein one or more selected from the group consisting of hydrogen, water and water vapor is added at least when the temperature is in a range of 500°C or higher during the calcining step [page 8, lines 1-4; page 10, lines 8-15].

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 2-4 and 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Armand et al (US 6,514,640) in view of Armand et al (WO 02/27823 A1) (This is a foreign reference and the examiner relied on machine translation).

Regarding claim 2-4, Armand '640 discloses that the calcining step has a first stage in a temperature range of room temperature to 300 through 350°C and a second stage in a temperature range of room temperature to the calcinations completion

temperature (800°C) [column 15, lines 36-41]. Armand '640 also teaches that a conductive carbon is added in the cathode material [column 4, lines 11-14], however, Armand '640 remains silent about the stage of the calcining step when carbon is added. Armand '823 teaches synthesis of carbon containing cathode material where the second stage of the calcining step is carried out after addition of a substance from which conductive carbon is formed by pyrolysis to the product of the first stage of the calcining step. Armand '823 also teaches that the calcination is carried out after conductive carbon is added to the ingredients before the first stage of the calcining step. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to utilize the teachings of pyrolysis of carbon material added in the second stage of the calcining step and also conductive carbon is added to the ingredients before the first stage of the calcining step as taught by Armand '823 in order to have a coating on at least a part of the surface of the particles of the compound $LiFePO_4$ with carbon and have a increased carbon dispersion within the compound.

Regarding claim 9, Armand '640 remains silent about adding water vapor during the calcination process. Armand '823 discloses that the method for producing a cathode material for a secondary battery wherein water vapor is added at least when the temperature is in a range of 500°C or higher during the calcining step to create locally the reducing atmosphere required for synthesis of the material. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to utilize water vapor as taught by Armand '823 in order to create locally the reducing atmosphere required for synthesis of the material.

10. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Armand et al (US 6,514,640) in view of Armand et al (WO 02/27823 A1) (This is a foreign reference and the examiner relied on machine translation) as applied in claim 2-3 and further in view of Yamasaki et al (US 5,888,671) and Shinozaki et al(US 6,585,915 B1).

Regarding claims 5-6, Armand '640/ Armand '823 remain silent about coal pitch or bitumen as the source of carbon material. However, Yamasaki discloses a cathode material for a battery as coal pitch [column 16, lines 5-10]. One of the source of Bitumen is coal pitch. Yamasaki remain silent about the properties of bitumen. Shinozaki discloses producing carbon material for capacitor electrode from a commercially available coal pitch by heat treatment at about 800 $^{o}$C having a softening point of 300 $^{o}$C [column 2, lines 1-11, 46-55, column 15, lines 7-10]. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to utilize this commercially available coal pitch as taught by Shinozaki in order to have carbon material having a relatively low crystallinity to bring the specific surface area to be high, and has a high durability when charging and discharging are repeated for a long period of time.

11. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Armand et al (US 6,514,640) in view of Armand et al (WO 02/27823 A1) (This is a foreign reference and the examiner relied on machine translation) as applied in claim 2-3 and further in view of Fujii et al(US 4,740,437).

12. Regarding claims 7-8, Armand '640/ Armand '823 remain silent about saccharide as the source of carbon material. However, Fujii teaches battery electrode material comprising saccharide [column 2, lines 5-18; column 3, lines 53-66]. Decomposition temperature is a property of the material. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to utilize saccharide as the source of carbon material as taught by Fujii in order to have carbon material having a stable in doping and dedoping of ions and is also capable of being doped with a large amount of ions for development of a non-pollutative secondary battery of light weight having high energy density.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MUHAMMAD SIDDIQUEE whose telephone number is (571)270-3719. The examiner can normally be reached on Monday-Thursday, 7:30 am to 4:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mikhail Korsakov can be reached on 571-272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MSS
/Michael Kornakov/
Supervisory Patent Examiner, Art Unit 4151